

The Hospital Discharge Survey

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A NATIONAL PROGRAM for producing short-term-hospital patient statistics on a continuing basis did not exist in the United States until the advent of the Hospital Discharge Survey in 1965. Prior to that date, patient statistics were being collected on a continuing basis for Federal hospitals, including those administered by the Veterans Administration, Armed Forces, and the Public Health Service. In addition, the Professional Activity Study, conducted by the Commission on Professional and Hospital Activities, has been collecting hospital patient statistics on a continuing basis for a number of participating hospitals.

The objective of the Hospital Discharge Survey is to produce national statistics on hospital patients, on a continuing basis, which are representative of the experience of the civilian population. The survey covers only short-term hospitals. Mental and chronic disease hospitals in which the average length of stay is 30 or more days are excluded. The survey is being conducted by the National Center for Health Statistics (NCHS) in the Public Health Service. It is based on information collected for a subsample of discharged patients selected within a national sample of hospitals. The principal sources of information in the survey are existing hospital records from which statistical information on the characteristics of the patient and his hospitalization are abstracted onto forms. These abstract forms are transmitted

to the NCHS for editing, processing, analysis, and publication.

Planning for the Hospital Discharge Survey started several years ago. In 1963, the National Center for Health Statistics contracted with the School of Public Health at the University of Pittsburgh to study the feasibility of conducting a national hospital discharge survey. Based on the favorable findings of this study (1), the NCHS, with the assistance and cooperation of the Bureau of the Census, conducted a pilot study in a national sample of 82 non-Federal hospitals during the 6-month period July-December 1964. The primary objective of the pilot study was to determine the most efficient procedures for abstracting information from hospital medical records for samples of discharged patients. The study tested two types of abstract forms for posting information drawn from the hospital records and tested two procedures for posting the information on the abstract forms. Some results of the pilot study are discussed later in this report.

Calendar year 1965 was the first data collection year of the Hospital Discharge Survey. Initially, the national survey had been planned to begin in July rather than January 1965. The schedule was accelerated so that statistics reflecting the hospital experience of the national population would be available for a full calendar year preceding inauguration of Medicare. The statistics collected during calendar year 1965 are based on a sample of about 300 hospitals and about 110,000 discharges.

The 82 non-Federal hospitals that participated in the pilot study have been requested to extend their period of participation and

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thereby become the first group of hospitals admitted into the continuing survey. In addition, 75 short-stay hospitals were asked to participate in the survey prior to January 1966. For these hospitals, a sample of discharges was selected retrospectively, starting with January 1965. Between January and July 1966, the sample was expanded by an additional 150 hospitals and a sample of discharges was selected retrospectively beginning with July 1965. Thereafter, it is planned to increase the number of hospitals in the sample to its ultimate size of about 700 hospitals as quickly as feasible.

Although the survey will include Federal as well as non-Federal hospitals, the design and procedures for Federal hospitals are not specifically covered in this article because they are still being planned. It is expected that special arrangements will be made with the Armed Forces and the Veterans Administration to get statistical information from their hospitals which is comparable to that described here for non-Federal hospitals.

The following progress report on the Hospital Discharge Survey describes its existing design, procedures, and content as well as the types of statistics being derived and some of their major uses. The report also describes some changes that have been made in the survey and other changes that are being contemplated.

Design of the Survey

The universe of non-Federal hospitals for the Hospital Discharge Survey includes about 6,700 short-term hospitals (hospitals in which the average length of stay is less than 30 days). The names and addresses of the short-term hospitals in the country as well as selected information about them, including bed size and type of service and ownership, are contained in the Master Facility Inventory of Hospitals and Institutions (2) maintained by the Division of Health Records Statistics in the National Center for Health Statistics. The Master Facility Inventory serves as the register for selecting sample hospitals for the Hospital Discharge Survey.

The matter of identifying and counting separate hospitals (establishment reporting units) is not always easy. It is particularly troublesome in large hospital complexes. The follow-

ing rule was adopted in the survey: An establishment reporting unit includes all units of the hospital complex within which the patient moves about without being discharged. If the move of a patient involves a discharge from one unit and an admission to another, the units are not counted as part of the same establishment unit. Thus, the number of reporting units in a hospital complex is determined by the practice of the hospital in classifying movements of patients as either transfers or discharges. This appears to be a reasonable, albeit arbitrary, procedure to use in a survey in which the unit of enumeration is the hospital discharge.

The survey of non-Federal hospitals involves a highly stratified two-stage sample design. In the first stage, a sample of about 10 percent of the hospitals, or 690 hospitals, was selected. The sample hospitals, stratified by number of beds and geographic division, are shown in the table. In the second stage, a sample of about 10 percent of the discharges within the 690 hospitals, or, on an average, a sample of about 400 discharges per hospital annually is selected. Thus, the overall sampling rate (the product of the sampling rate in the first and second stages) is approximately 1 percent or 1 in 100 discharges.

Even though the 690 hospitals in the sample represent about 10 percent of the hospitals in the country, they account for about 20 percent of the hospital beds. The hospitals were selected with probability proportionate to size, and consequently relatively more of the larger hospitals are included. However, the within-hospital sampling fraction (the sampling fraction for selecting discharges) in each hospital is such as to assure an overall sampling rate of roughly 1 in 100 discharges. Thus, the within-hospital sampling fraction varies inversely with the size of the hospital, the smallest fraction of discharges being selected in the largest hospitals, and the largest fraction being selected in the smallest hospitals. This feature of the sample design tends to equalize the sample size of discharges among all sizes of hospitals.

The 690 sample hospitals are grouped into 10 hospital panels, consisting of 1 so-called certainty panel because it contains all 18 non-Federal hospitals in the country with 1,000 or more

Stratification of hospitals in the master sample of Hospital Discharge Survey, by size of hospital and geographic area

Geographic area	Hospital size (number of beds) ¹							
	All hospitals	6-49	50-99	100-199	200-299	300-499	500-999	1,000 and over
Total.....	690	89	99	143	125	134	82	18
Northeast.....	180	10	18	36	44	36	27	9
New England.....	44	4	7	9	12	8	3	1
Middle Atlantic.....	136	6	11	27	32	28	24	8
North Central.....	208	26	27	45	36	44	27	3
Northeast Central.....	135	8	18	30	27	30	19	3
West North Central.....	73	18	9	15	9	14	8	-----
South.....	201	35	36	44	27	36	18	5
South Atlantic.....	92	9	15	21	15	21	7	4
East South Central.....	42	7	9	10	5	7	4	-----
West South Central.....	67	19	12	13	7	8	7	1
West.....	101	18	18	18	18	18	10	1
Mountain.....	28	8	5	6	5	4	-----	-----
Pacific.....	73	10	13	12	13	14	10	1

¹ Hospitals with fewer than 6 beds are not included in the survey.

beds and 9 panels of hospitals containing about 75 hospitals each. Any one of the nine panels, when combined with the certainty panel of hospitals, represents a national sample of hospitals. Grouping the hospitals into panels provides a degree of flexibility to the survey: (a) the panels will be used as building blocks in expanding the sample of hospitals, (b) ultimately, the number of panels in the survey may be increased or decreased as further experience and future events dictate, and (c) ad hoc studies may be limited to fewer than 10 panels and yet provide unbiased national estimates.

The length of participation of the sample hospitals in the survey will vary. None, except for the largest hospitals, will remain in the survey permanently. Hospitals will probably be rotated in and out of the sample at intervals of perhaps 3 to 5 years. For example, after participating for a certain number of years, a sample hospital would be dropped and a new one drawn into the sample. In this manner, the burden of participating would not be limited to the hospitals initially selected in the sample. Rotation of hospitals in the survey also has an important statistical advantage—it reduces the impact of the survey on the participating hospitals and thereby tends to preserve their representativeness of hospitals in the country. Also,

about every 3 to 5 years, a sample of the newly established short-term hospitals would be selected and added to the panels.

Survey Procedures

The major phases of the Hospital Discharge Survey include (a) obtaining the approval of hospitals, (b) selecting samples of discharges within hospitals, (c) abstracting information from hospital records for sample discharges, and (d) processing the statistical information at the NCHS.

The first contact with sample hospitals is by an introductory letter from the American Hospital Association (AHA), which has endorsed the survey and has been cooperating with the NCHS in its conduct. The AHA letter is followed by a letter from the National Center describing the objectives and procedures of the survey. Shortly thereafter, a representative of the NCHS (either an employee of the Center or of the Bureau of the Census) telephones the hospital administrator to arrange to visit the hospital. The primary objective of the personal visit is to obtain the hospital's cooperation and to negotiate an agreement with the administrator for hospital services to be provided in the survey. Having obtained the administrator's approval, the NCHS representative discusses

the implementation of the survey with the medical record librarian or the person in charge of the medical record department.

In nearly all hospitals, the daily listing of discharges is the frame from which samples of discharges are selected. The sample discharges are selected systematically from this listing.

The frequency at which discharges are sampled depends on the kind of arrangement made with the hospital. In those hospitals where an employee of the NCHS, or an employee of the Bureau of the Census representing the NCHS, selects the sample and abstracts the hospital records, the sampling is usually performed at quarterly intervals. The representative visits the hospital after each quarter and selects the sample of discharges for the preceding 3-month period, with the understanding that the hospital will have these patient folders ready for abstracting when he returns 3 months later. For example, on his July visit, the NCHS representative selects the sample discharges for April, May, and June. The hospital would have pulled and have ready for him to abstract the patient folders for the sample discharges that occurred during January, February, and March, which he selected on his April visit.

On the other hand, the sampling of discharges and abstracting is frequently done daily, where the arrangement calls for the hospital personnel to perform this work. Whether the sampling and abstracting is actually done daily, weekly, or monthly, however, is left to the discretion of the hospitals, since they transmit the prepared abstracts to the NCHS on a monthly basis.

Both kinds of arrangement for selecting samples of discharges and abstracting patient records were made with hospitals in the pilot study. Arranging to have this work done by the hospital personnel in the medical records department, rather than by an NCHS field representative, has definite advantages. It appears to be more economical to pay the hospital than to pay a traveling field agent. Also, hospital personnel have a knowledge of their hospital records and medical terminology which the outside person lacks, and this is a most important consideration, particularly in abstracting medical information. Consequently, hospitals that have joined the survey since the pilot study, as well as the pilot study hospitals, are being re-

quested to have the work done by their personnel. Fortunately, few hospitals have objected to this.

An abstract form is completed for each sample discharge. From the information recorded in the patient's medical records (usually from the summary sheet of the patient's folder), the abstractor codes specified personal and administrative information on the front side of the form and on the reverse side he transcribes the diagnoses and operations.

Shipments of completed abstract forms for each sample hospital are transmitted to the NCHS for processing. Every shipment of abstracts is reviewed, and each abstract form is edited and, when necessary, problems of missing, incomplete, or inadequate forms are referred back to the hospitals for correction. Up to five diagnoses and up to three operations recorded on the abstract forms are coded according to the International Classification of Diseases Adapted for Indexing Hospital Records by Diseases and Operations (*β*), as modified by the Medical Coding Manual prepared by the Hospital Discharge Survey.

Two versions of the abstract form were used in the pilot study of the survey, an optical page reader form and a conventional form. Both report identical information, but their formats differ and they are processed somewhat differently. The coded information on the conventional abstract form is reproduced on a punchcard, which is then converted to computer tape. The preparation of a punchcard is not required for the optical page reader abstract form, because the coded information is converted directly to computer tape by an optical page reader machine.

As for data processing convenience in the National Center for Health Statistics, the optical page reader abstract form was preferred. It was recognized, however, that it was somewhat more difficult to code the optical page reader form than the conventional abstract form. This fact was confirmed to some extent by the results of the pilot study, which indicated a somewhat higher abstracting error rate for hospital personnel using the optical page reader form rather than the conventional abstract form. Nevertheless, NCHS decided to use the optical page reader form exclusively,

since it is believed that the error rates with this form will decline after the transcribers become more familiar with it.

Content of the Survey

The primary objective of the Hospital Discharge Survey is to produce statistics on hospital morbidity and on the use of short-term hospitals. For this reason, the discharged patient is the unit of enumeration. The admission might have been used as the unit of enumeration, but some of the information being collected in the survey, such as the discharge date and the discharge diagnoses, would not be available until the patient was discharged.

Characteristics of the hospital, including ownership, size, and location, are already available from the Master Facility Inventory of Hospitals and Institutions. To provide data on the amount and kinds of hospital resources is not per se a primary objective of the survey. However, the survey will produce statistical tabulations of discharged patients by characteristics of the hospital as well as characteristics of the patient.

Core data, basic facts about the patient and his hospitalization needed for annual trend statistics, will be collected on a regular and continuing basis for all discharges in the Hospital Discharge Survey. Currently, the following items of information are being collected: (a) personal information about the patient, including birth date, sex, color, and marital status, but not his name and address, (b) administrative information about the hospitalization, including dates of admission and discharge, discharge status (whether discharged alive or dead), and patient's medical record number, and (c) medical information, including discharge diagnoses and surgical operations.

During the pilot study that preceded the initiation of the survey in January 1965, the core data collected in the survey were restricted entirely to information about the discharged patient obtained from the summary sheet of his medical record folder. At that time, it seemed neither feasible nor efficient to abstract information from other medical records, since it was uncertain that arrangements could be made with the hospitals to have their medical records staffs perform this work. The summary sheet of the

medical record folder turned out to be an adequate source for the nonmedical items of information, but inadequate for the medical items. The pilot study detected the following potential sources of error in the medical information as abstracted from the summary face sheet.

1. Occasional difficulty in identifying discharge diagnoses, because they were not specifically stated in the captions on the summary sheet. Summaries in some hospitals, for example, did not list admission and discharge diagnoses separately.

2. Hospitals varied in the completeness with which the diagnostic information was recorded on the summary sheet. For teaching hospitals, the information was detailed and comprehensive; for small hospitals it was sparse.

3. Illegibility and incompleteness of the information on diagnoses and operations recorded on the summary sheet presented difficulties in medical coding and affected the accuracy of the coding process.

Because of these difficulties, the ground rules for completing the medical items on the abstract forms have been changed. Hospital employees who prepare the abstract forms have been instructed not to restrict themselves to the summary sheet but to refer, as needed, to other pages in the patient's folder, in order to ascertain the discharge diagnoses and operations, if any. Whether this procedure will produce agreement among the hospitals in discharge diagnoses recorded on the abstract forms is questionable. In order to maximize concordance in the survey, discharge or final diagnoses have been explicitly defined to include the principal or primary disease(s) and condition(s) for which the patient was admitted to the hospital, other diseases and conditions resulting from the principal condition(s), and other concurrent diagnosis significant to the hospitalization.

Many problems remain to be resolved with regard to the diagnostic information being collected. For example, the survey is not at present identifying a single diagnosis most responsible for the hospital episode. Thus, in preparing the specifications for tabulating diagnoses, the survey was faced with the dilemma of counting all diagnoses, without distinction or counting the first diagnosis recorded on the abstract form implicitly, assuming there-

by that the first recorded diagnosis has special significance. As a temporary expedient, it was decided to tabulate diagnoses both ways.

Further changes in the medical statistics being collected and in the procedures for collecting them are being considered. Meetings have been held with users of hospital patient statistics to determine the needs for morbidity statistics on hospitalized patients. These meetings provided a basis for deciding what should be collected and for developing appropriate morbidity concepts and definitions. Concomitantly, research studies are being undertaken to investigate the feasibility of getting from existing hospital medical records the types of medical statistics needed by the consumer. This work most likely will require testing alternative hospital sources of information as well as alternative procedures for abstracting this information.

In addition to the core items of information being collected from the medical records, the survey also plans to collect information on the patient's hospital charges. The NCHS has been examining the feasibility of abstracting information from the hospital billing records on the charges assessed the discharged patient. The survey would collect data on charges for room and board and for combined other services and detailed data on hospital charges by sources of payment. Many problems of procedure and definition remain to be solved before national statistics on hospital charges will be derived.

In addition to the core items of information regularly abstracted from the patient's medical and billing records, it is planned that the survey will serve also as a mechanism for collecting hospital patient statistics on topics of national interest for which data are needed periodically. The specified topic might require the collection of more detailed information about all discharges in the sample. For example, an ecological study of areas of residence of the discharged patient would require information on the location of the patient's place of residence. On the other hand, the topic might require the collection of more detailed information, but only for subgroupings of discharges specified by either diagnoses treated or by the personal characteristics of the patient.

All types of hospital records are potential sources of information in these topical studies,

including X-ray findings, pathological reports, and diagnostic indexes. Occasionally, the discharges in the survey might serve as a sampling frame for followup studies in which information not available in the hospital records would be collected from the discharged patient or his family. The scope of the survey is theoretically quite broad at present, but the actual undertaking of topical studies may be delayed for some years.

Survey Statistics and Their Uses

The survey will produce national statistics covering the 50 States and the District of Columbia. It will also produce statistics for combinations of States represented by the following nine geographic subdivisions: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific.

The sample design and sample size will not, however, permit the survey to produce statistics for individual hospitals, for individual States, or for smaller geographic areas. It may be possible, however, within the nine geographic subdivisions or for combinations of them to derive statistics for Standard Metropolitan Statistical Areas (SMSA) and non-SMSA's. Obviously, the sample design will permit much greater detail in the national tabulations than in the tabulations for the geographic subdivisions. For example, the sampling error of a statistic based on 1 percent of the discharges (about 270,000 discharges nationally and 30,000 discharges within a geographic subdivision) will be about 3 percent or 8,100 discharges for national statistics and about 10 percent or 3,000 discharges for statistics for geographic subdivisions.

On a continuing basis, the survey will produce statistics characterizing the patient in terms of (a) the type, size, and ownership of the hospital from which discharged, (b) his personal characteristics, including age, color, sex, and marital status, (c) length of stay in the hospital, (d) the medical conditions treated and operations, if any, and (e) sometime in the future, the hospital charges according to the services rendered by the hospital and the sources that paid the bill.

The survey will produce population rates of hospital use by age and other characteristics of patients. Numerators of these rates will be estimated directly from the survey; denominators will be based on independent estimates of population for the country and the geographic subdivisions.

The survey will produce statistics tabulated on a hospital episode basis, but not on a person basis. Thus, the survey will estimate the number of discharges but not the number of hospitalized patients. It will estimate also the average length of stay per episode of hospital care but not the average hospital stay per patient per year. Production of hospital person statistics seems to require linking discharges on a person basis, a procedure which the survey is basically not equipped to handle since patients are not identified by name and only a sample of discharges is selected.

An annual series of statistics will be compiled on the basis of discharges occurring during a calendar year period, starting with 1965. The statistics compiled during the initial period of the survey are being limited to those items of information currently being abstracted from the patient's medical records. Subsequently, the annual series of statistics will be expanded to include basic information on hospital charges that will be abstracted from the patient's billing records.

Subannual statistics, probably on a quarterly basis, will most likely be compiled as a regular and continuing series, starting with estimates based on the pilot study covering discharges for the 3-month period October-December 1964 (4). Compared to the statistics compiled annually, the quarterly statistics will be much less detailed but more current. Options for combining units of quarterly statistics will give flexibility to the tabulation program. Thus, grouping the quarters on a fiscal year basis would be useful in analyzing annual trends of certain conditions such as influenza and pneumonia for which the seasonal peak in the number of discharges is attained during the late fall and winter months.

Why produce national hospital patient statistics? The primary purpose of these statistics is to serve as objective bases for administrative and scientific decisions. In view of the

complex health and medical problems facing the country, Woolsey (5) recently highlighted the following points in stressing the importance of national hospital patient statistics: (a) as an industry, short-term hospitals collectively represent an enormous economic asset, employing about 1½ million persons and providing services valued at billions of dollars annually, (b) short-term hospitals increasingly occupy a central position in the system of medical care services in this country, and (c) short-term hospitals are rapidly changing in character, because of advances in medical technology and the impact of voluntary health insurance and public assistance care on the way hospital charges are being paid. In view of the passage of Public Law 89-97 in 1965, which added to the Social Security Act provision for a hospital insurance plan for persons aged 65 and over, further changes can be expected in the character and use of short-term hospitals.

Statistics derived from the Hospital Discharge Survey will have administrative uses, and they will also have important uses as morbidity statistics.

Statistics depicting patterns of and trends in hospital use by characteristics of the patient and his hospitalization will have important administrative uses for national and broad regional planning. Since the survey will not produce estimates for individual States or smaller geographic areas, hospital planning on the State and local levels will have to depend on other sources of information such as State surveys or surveys conducted under local auspices. However, the Hospital Discharge Survey would serve State and local planning areas by providing baseline statistics for the nation and for broad geographic areas, as a backdrop for statistics derived from State and local area surveys. Similarly, the survey would provide a useful function for individual hospitals. Patient statistics produced by individual hospitals could be compared with statistics tabulated from the survey for hospitals in the same broad geographic area and of the same size and ownership.

The diagnostic information collected in the survey will have important uses when viewed as morbidity statistics. For certain conditions, such as cancer, complications of delivery, morbidity originating in the hospital, and surgical

conditions, hospital patient statistics will be excellent sources of morbidity statistics. The value of diagnostic information as morbidity statistics, of course, will be greatly enhanced when the survey statistics are pooled and related to vital statistics as well as other morbidity statistics derived from the National Health Survey (6).

Many specific uses of hospital patient statistics could be enumerated, but that is not the purpose of this general discussion. However, important uses of hospital patient statistics will be discovered, even though not now anticipated. In this respect, the Hospital Discharge Survey is a mechanism for making measurable observations on hospitalized patients and the survey is not necessarily limited to the scope of its present program. If it is successful, the survey will systematize and make comparable information collected from a wide range of hospitals, and this technological advance in making observations surely will have many applications and research uses.

Summary

The Hospital Discharge Survey is the most recent program development within the National Center for Health Statistics of the Public Health Service. The objective of the survey is to produce national statistics on hospital patients, on a continuing basis, which are representative of the experience of the civilian population in short-term hospitals. The survey is based on information collected for subsamples of patients discharged from a national sample of several hundred hospitals. The principal sources of information in the survey are existing hospital records. Statistical information on the characteristics of the patient and his hospitalization are abstracted onto forms that are transmitted to the National Center for editing, processing, analysis, and publication.

The statistics derived from the Hospital Discharge Survey will be coordinated with statistics emanating from other programs in the National Center for Health Statistics to produce an integrated set of statistics responsive to the needs for information about the nation's health.

The Hospital Discharge Survey was planned when the limitations of the existing survey mechanisms of the National Center were recog-

nized in view of the expanded need for hospital patient statistics. The procedures for the survey were developed in a pilot study that was conducted during the latter half of 1964. The statistics collected during calendar year 1965, which represents the first data collection year of the survey, are based on a national sample of about 110,000 discharges from about 300 hospitals. The size of the sample is being increased during 1966 and may be increased further during 1967, so that ultimately the full sample size of 300,000 discharges and 700 hospitals will be attained.

The information collected during 1966 and thereafter will be abstracted from the patients' medical records. In the future, supplementary information pertaining to hospital charges will be abstracted from the patient's billing records. Over the next several years, a substantial amount of methodological work is contemplated to improve the quality of information and to expand the scope of information being collected.

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